

A NEW TERMITOPHILOUS PHORID (DIPTERA).

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(Twelve Text-figures.)

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Only a few of the Australian Phoridae have been described, and of most of these the habits and early stages are unknown. The species described below was bred from larvae collected by H. J. Willings in mounds of *Eutermes exitiosus* in Sydney. The termitophilous habit is fairly common amongst Phoridae, and two of the Australian species are known to be associated with termites, namely, *Eutermiphora abdominalis* Lea in nests of *Eutermes fumipennis* (Lea, 1911), and *Dorniphora rhinotermis* Schmitz and Mjöberg in nests of *Rhinotermes* sp. (Schmitz and Mjöberg, 1924). Our species runs in Schmitz's key (1929) to the genus *Diploneura*, which already contains two species (*D. conspicua* Borg. and *D. myersi* Brues, from Trinidad) bred from nests of *Eutermes* (Brues, 1932).

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List of described Australian Phoridae.

Apiochaeta crassimana Brues, 1905 (N.S.W.), *A. debilis* Brues, 1905 (N.S.W.), *A. ?pulicaria* Fallen, 1823 (Australia), *A. sodalis* Brues, 1915 (N.S.W.), *A. tasmaniensis* Malloch, 1912 (Tasmania); *Dorniphora setitibia* Malloch, 1925 (Sydney), *D. nigrita* Malloch, 1925 (Sydney), *D. atratula* Malloch, 1925 (Sydney), *D. nigroscutellata* Malloch, 1925 (Sydney), *D. rhinotermis* Schmitz & Mjöberg, 1924 (Atherton, Q.); *Phora nebulosa* Walker, 1857 (Tasmania); *Apocephalus niger* Malloch, 1935 (Sydney); *Sciadocera rufomaculata* White, 1916 (Tasmania); *Neopuliciphora microphthalma* Schmitz & Mjöberg, 1924 (Evelyne, Q.); *Eutermiphora abdominalis* Lea, 1911 (Sydney); *Diploneura scoparia* Brues, 1932 (Sydney and Brisbane), *D. gynaptera*, n. sp. (Sydney).

DIPLONEURA GYNAPTERA, n. sp.

A dark species about 3 mm. long, with yellow legs. Female apterous and puliciform. Male with a dark stigma on the wing.

♂. *Head* (Text-fig. 1): Frons broad, half the head-width, black and shining; ocelli present. Chaetotaxy complete, frontal bristles reclinate, in three straight transverse rows of four; anterior row arranged in two divergent pairs; supra-antennal pair erect and divergent. Frons with some small hairs between the bristles. One post-vertical bristle on each side; a row of strong postocular bristles continued to lower corner of eye, the last one larger than others; one oral bristle on each side, same length as last postocular; one genal bristle each side close to eye margin, smaller than oral bristles. Antennal cavities not well developed. Antenna orange-yellow; with basal segment cylindrical, but tapering slightly;

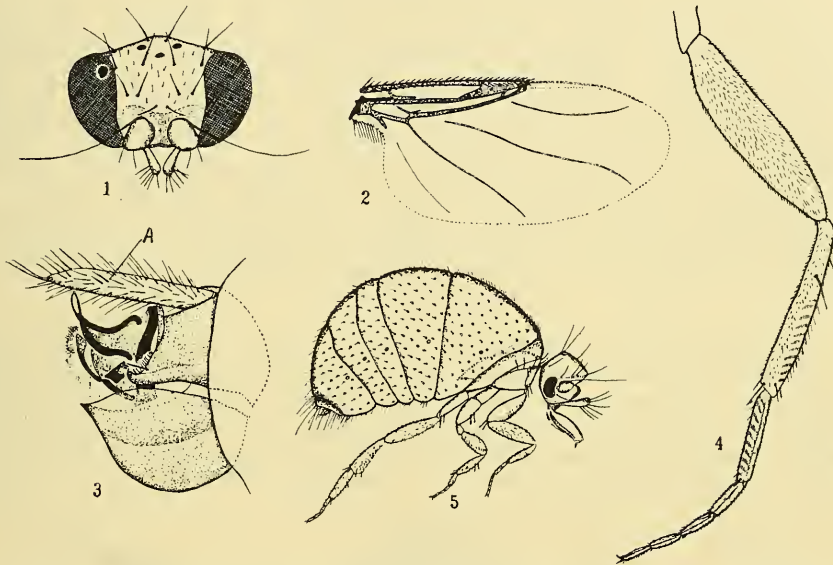
base of second segment visible, small and narrow; third segment somewhat dome-shaped and bulbous, finely but distinctly pubescent (basal joints apparently bare). Arista black, arising dorso-laterally and sub-apically from third segment, with first two joints short and bare, long thread-like third joint short pubescent. Eyes apparently bare, but at high magnification ($\times 100$) seen to be clothed with exceedingly minute sparse, pale hairs. Palpi orange-yellow, finely pubescent; six strong black bristles near apex, and some smaller bristles at base. Proboscis short, labellae yellow, with pseudotracheae, and covered with fine hairs beneath.

Thorax: Mesonotum dark brown, almost black, covered with fine light brown hairs. Pronotum visible from above, as two small sclerites at sides of mesonotum, covered with similar hairs to mesonotum, bearing one strong humeral bristle. Mesonotum with one pair of dorso-central bristles at posterior border, and a straight line of five bristles along each lateral margin. Tegula with a fan of 7 or 8 bristles. Propleura with a pair of strong bristles near upper posterior edge directed upwards, and three bristles at the ventral margin directed downwards; a number of small hairs present. (Note: The chaetotaxy of propleura is variable, 3 upper in some and only 2 lower or a weaker third, but in holotype and most specimens as described.) Mesopleura undivided; without bristles or hairs; dark brown, with a greyish pruinescence when viewed obliquely. Halteres with a yellowish base and a dark brown knob with greyish pruinescence. Scutellum dark brown, almost black, shining, bare; more than twice as wide as long; four marginal bristles, inner larger than outer two. Wing hyaline, 3-4 mm. long (Text-fig. 2), covered with fine microtrichia; a single spine at base of radius; costa extending about half the length of anterior margin, costal bristles almost twice the width of vein; two stronger bristles at base of costa; second vein widened at end to a conspicuous brown stigma; third vein forked at end just before its junction with costa, the short cell so formed being wide. Squame small and rounded with close fringe of soft golden hairs; alular margin of wing with a fringe of long bristles.

Abdomen dark brown, with greyish pruinescence; hind margin of each segment with a narrow lighter band; a row of exceedingly minute hairs along hind margin of each segment, increasing in development from first to sixth, and a group at side margins. Sixth segment longer than others, with some minute hairs on dorsum as well as margin. Tergites normal, venter entirely membranous. Genitalia large, asymmetrical, yellow, with brown tinges below and at sides, where it has a greyish bloom like the abdomen; anal tube long, cylindrical and finger-like, yellow, clothed with long black hairs; outer or side pieces forming a cup enclosing the complex aedeagus (Text-fig. 3).

Legs yellow, robust, setulose, the hind pair longer than the others. Fore-legs with coxae greatly enlarged and dilated, almost five-sixths the length of femur, with three large bristles, two apical and one sub-apical; femur flattened, without bristles; tibia with some small single bristles slightly larger than the hairs, the strongest one dorso-central, two dorsal in apical half, and two at apex; faint postero-ventral transverse rows of fine golden cilia in apical half; tarsal segments with two black, longitudinal dorsal palisades. Mid-legs (Text-fig. 4) with coxae dark brown, yellow at apex, three large bristles externally, one being apical; femur without bristles; tibia with one dorsal and one antero-dorsal bristle in the basal fourth, and a crown of five at apex, with faint obliquely transverse antero-dorsal combs of golden cilia in the apical half, and one slightly-developed black dorsal palisade; tarsal segments with two palisades, one postero-ventral and one antero-ventral; metatarsus with well-developed oblique transverse combs of golden cilia

for whole length between the two palisades. Hind coxa with a narrow dorsal process, a pair of characteristic bristles before the apex, pointing outwards, and three at apex, one being larger than others; femur large; tibia with five apical spines, two dorsal palisades set close together, very faint development of combs of golden cilia at apex posteriorly; metatarsus with one antero-ventral bristle before the middle, and well developed oblique combs of golden cilia posteriorly; each tarsal segment with three palisades, the antero-dorsal and antero-ventral ones being strong and conspicuous, the dorsal one weaker; claws simple and equal; empodium bristle-like; pulvilli hairy.



Text-figs. 1-5.—*Diploneura gynaptera*.—1. Head of male, $\times 24$ approx. 2. Wing of male, $\times 12$. 3. Male genitalia, $\times 36$; a, anal tube. 4. Mid-leg of male, $\times 22$. 5. Female, $\times 15$.

♀. (Text-fig. 5.) Length 2 mm. *Head* dark brown, smaller than that of male; frons very wide, about three-fourths of the head-width, shining, produced forwards above antennal cavity; eyes reduced; ocelli present. Chaetotaxy complete, and small hairs also present; bristles scarcely reclinate, more erect, supra-antennal pair perpendicular, rest of head-bristles as in male, but all more slender and hair-like. Palpi yellow, larger and more hairy than in male, the six bristles near apex more slender and longer. Proboscis much larger than in male, peculiarly developed into a strongly chitinized tube; labellae reduced, and a chitinous hook projecting between them ventrally. Antennal cavities more developed than in male, antennae the same colour but smaller, the third segment shorter and more rounded, arista with longer and more noticeable pubescence than in male.

Thorax very reduced, consisting of a very narrow dorsal strip which is hidden in a groove behind the head, has a row of fine hairs and a pair of small bristles and is probably the reduced mesonotum, as it widens laterally into a small triangular piece on each side, which is visible from above, and bears a series of five large bristles along the margin. The propleura is a small rounded oval

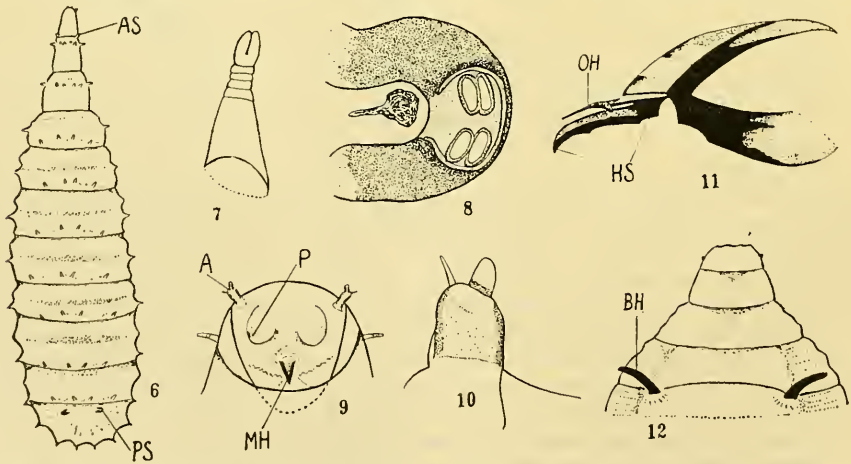
sclerite bearing a number of small bristly hairs, with two slightly larger ones above directed upwards and two below directed downwards; it has almost the same chaetotaxy as the male. The mesopleuron is bare. On clearing, some sclerites of the thorax, which are enveloped by the first abdominal segment, become visible internally. There are no vestiges of wings or halteres. Legs have the same structure as in the male but are reduced in size, with the tarsal segments, except the hind metatarsus, much shorter. There is no palisade on the fore-legs, a weak single palisade on the tarsi of the mid-legs, and a single anterior strong palisade on the tibia and tarsi of the hind-legs. The combs of golden cilia are well developed on the tibia and metatarsus of all legs.

Abdomen dark brown, shining and large, strongly convex above, all segments chitinous dorsally, becoming membranous laterally and ventrally. Five large segments, the first very elongate and produced dorsally above the legs with an anterior membranous fold reaching the back of the head; the sixth small and narrow and telescoped into the fifth. Ovipositor retracted, small, hairy, yellow. Whole of abdomen covered dorsally and ventrally with sparse, short, pale hairs arising from small dark pits; the anterior fold of first segment devoid of hairs; hind margins of fifth and sixth segments with long dense bristle-like hairs.

Distribution.—Sydney (February, 1935). Bred from larvae in mounds of *Eutermes exitiosus* (H. J. Willings). Holotype ♂, allotype ♀, and 8 ♂, 3 ♀ paratypes in the collection of the Division of Economic Entomology, Canberra.

The Larva.

The full-grown larva (Text-fig. 6) is 5.5 to 6.5 mm. long, club-shaped, and creamy-white in colour. The dorsal and ventral surfaces are convex, flattened into a slight ridge laterally. The head (Text-fig. 9) is bilobed, each lobe bearing a conspicuous antenna and a flat palp. The antenna (Text-fig. 10) consists of an elongate cylindrical segment, with a tiny dome-shaped segment at the apex, and a narrow pencil-like projection beside it. The palp is a flat disc with a small



Text-figs. 6-12.—*Diploneura gynaptera*.—6. Larva, $\times 9.5$ (as, anterior spiracles; ps, posterior spiracles). 7. Larval papilla, $\times 360$. 8. Posterior spiracle, $\times 290$. 9. Head of larva, $\times 72$ (a, antenna; mh, median hook; p, palp). 10. Antenna, $\times 360$. 11. Mouth Parts, $\times 80$ (hs, hypopharyngeal sclerites; oh, oral hooks). 12. Anterior end of puparium, $\times 20$ (bh, breathing horn).

group of sensillae. The mouth-parts (Text-fig. 11) are small and of the same general structure as *Phora* (Keilin, 1911) and *Sciadocera* (Fuller, 1934). The pharyngeal sclerites have a wide gap or incision, with narrow cornua of equal length. The floor of the pharynx is ridged. The plate joining the dorsal edges of the pharyngeal sclerites projects forward over the hypopharyngeal sclerites, and consists of thin chitin with two arches of stronger chitin. The hypopharyngeal sclerite is narrow and elongate, joined at its posterior end to the pharyngeal sclerite. The arms are united ventrally, form a narrow trough dorsally, and are produced into a single strong down-curved hook at the anterior extremity. This curved point projects between the head lobes ventrally and is the only portion of the mouth part visible externally. The condition is unusual, the arms of the pharyngeal sclerite being normally connected only by the hypostomal arch and the point being small and supplementary to the buccal hooks. The oral hooks are reduced to a pair of very slender, lightly chitinized sclerites, lying above the hypopharyngeal sclerites and slightly lateral to them, and articulating with a short dorsal branch of these sclerites. They do not extend to the hooked end of the hypopharyngeal sclerites. They are bifurcated posteriorly and straight, narrow and pointed anteriorly. Projecting from the anterior edge of the pharyngeal sclerites are a pair of narrow rods of fairly light chitin, lying close to the dorsal side of the hypopharyngeal sclerites and extending to the base of the buccal hooks.

The thoracic segments are narrow and elongate, becoming progressively narrower from the third to the head, forming a "neck". Although the appearance of the larva is smooth, the whole of the surface, with the exception of part of the ventral area, is covered closely with minute, colourless spinules, as in the larva of *Dorniphora venusta* (Jones, 1918). Ventrally each thoracic segment bears a pair of tiny elevations, one on each side near the lateral edge, and each bearing two exceedingly fine hairs. Dorsally the first segment has a transverse series of four, and the second and third a similar series of six colourless, elongate papillae. These are ringed, giving them an apparent segmentation, and their apices are bifid (Text-fig. 7). The dorsum of each abdominal segment except the eighth bears a series of four papillae in the posterior third. There is a slight transverse groove in the centre of each segment extending across the dorsum. Laterally there is a protuberance bearing a papilla in line with the dorsal series. Anterior to this is a smaller, rounded lateral projection, and posterior to it a much smaller one. Thus each segment has three lateral projections, which gives a "scalloped" edge to the larva when viewed from above. The eighth segment is flattened and slopes away to the posterior extremity. It has six protuberances around the edge, each bearing a papilla. Ventro-laterally each segment bears a single large swelling with a papilla. There is a transverse groove across each segment ventrally, and the two fleshy ridges produced on each side of the groove are broken up into a series of rounded tubercles or pseudopods. There are six to each ridge, making twelve to each segment. The ventral surface of the eighth segment is reduced to a narrow strip bearing the anus in the centre, with a rounded swelling on each side of it, and a lateral protuberance bearing a small papilla. Occupying a postero-ventral position, posterior to the eighth is a small sternite, hidden from above and bearing a pair of large protuberances, probably the ninth segment.

The anterior spiracles are small, each consisting of a circular, brown plate at the end of a projecting tube containing the elongate felt-chamber. The plate has a thickened rim, and has three oval slits spread fan-wise. The posterior spiracles (Text-fig. 8) are near the anterior border of the eighth abdominal segment, are well separated, and are raised on a slight ridge. Each consists of a horseshoe-

shaped mass of chitin with the spiracular plate in the "toe", which faces laterally. There are two pairs of small slits in the plate, and the cicatrix or scar is in the opening or bay of the horseshoe.

As it proceeds towards pupation the larva becomes contracted, the neck becomes shorter, giving it a short bottle shape, and it becomes more flattened dorso-ventrally, and deeper cream in colour.

The Puparium.

The puparia producing male and female flies may be distinguished by the different shape and size. The male is $4\frac{1}{2}$ to 5 mm. long and the female nearly 3 to $3\frac{1}{2}$ mm. in length. The female is also broader in proportion to its length, and narrows more sharply to the anterior end. The general shape of the pupa is similar to the prepupa or contracted larva. It is flattened dorso-ventrally, although the dorsal and ventral surfaces are convex, the ventral being more strongly convex than the dorsal. It slopes away at each end. The chitin is strong and brown, a firm resistant shell being left when the fly emerges. The larval papillae remain as short projections or chitinous dots, being most distinct at the posterior end, and the spiracles are still noticeable.

The pupal breathing horns (Text-fig. 12) are elongate and strong, projecting upwards and sideways, being slightly curved. They are on the dorsum of the fifth segment. Dehiscence is across the sixth segment and along both lateral edges to the head-capsule, which consists of the first three segments, and splits off separately. The dorsal plate lifts off in one piece carrying the breathing horns. In *Sciadocera* and *Phora* the dorsal plate splits longitudinally down the centre.

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